



A REVIEW ON ASSESSING QUALITY OF LIFE IN INDIVIDUALS AFFECTED BY LOWER RESPIRATORY TRACT INFECTION

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ABSTRACT

Lower Respiratory Tract Infections (LRTIs) pose a substantial global health challenge, affecting millions annually and demanding comprehensive approaches for effective management. While the clinical manifestations of LRTIs are well-documented, understanding their impact on the Quality of Life (QoL) of affected individuals is paramount for providing holistic care. This review navigates through diverse methodologies employed to assess QoL in the context of LRTIs, encompassing generic and disease-specific instruments, psychosocial assessments, and emerging trends in the field. By exploring factors influencing QoL, including symptom severity, comorbidities, and treatment modalities, we unravel the intricate web of considerations in the holistic care of LRTI patients. Beyond immediate clinical concerns, long-term implications and patient perspectives provide a nuanced understanding of the enduring effects and coping mechanisms. The review underscores the importance of personalized, patient-centered approaches and identifies gaps in current knowledge, paving the way for future research to enhance the well-being of individuals affected by LRTIs. As we delve into this synthesis of existing literature, we aim to contribute to a more comprehensive understanding of the interplay between Lower Respiratory Tract Infections and Quality of Life, fostering improved clinical care, informed public health strategies, and a compassionate response to the challenges faced by those navigating LRTIs.

INTRODUCTION

Lower Respiratory Tract Infections (LRTIs) represent a substantial global health challenge, affecting millions of individuals annually and imposing a significant burden on healthcare systems worldwide (World Health Organization, 2018)¹. Defined as infections involving the lower respiratory system, including pneumonia, bronchitis, and bronchiolitis, LRTIs present not only acute clinical complexities but also pervasive consequences for the overall Quality of Life (QoL) of those affected².

Epidemiological data underscores the magnitude of the issue, with LRTIs contributing substantially to morbidity and mortality, particularly among vulnerable populations such as the elderly, children, and immunocompromised individuals (Global Burden of Disease Collaborative Network, 2020)². While the immediate clinical manifestations of LRTIs are well-recognized, the broader impact on the well-being and daily lives of affected individuals is a complex and often overlooked aspect².

This review aims to unravel the multifaceted relationship between LRTIs and QoL, exploring the methodologies used for QoL assessment in this context. Assessing QoL provides a lens through which we can understand the subjective experiences of individuals, going beyond traditional clinical metrics to capture the holistic impact of LRTIs². By examining both generic and disease-specific instruments, as well as psychosocial assessments, we seek to construct a comprehensive overview of the existing methodologies².

Recognizing the significance of QoL assessment in the context of LRTIs extends beyond the realms of clinical care. It holds implications for healthcare planning, resource allocation, and the provision of patient-centered care³. A nuanced understanding of the impact of LRTIs on QoL informs tailored treatment strategies, rehabilitation plans, and public health interventions, ultimately contributing to improved health outcomes³.

As we embark on this exploration, drawing insights from existing literature, our goal is to provide a foundation for understanding the intricate interplay between LRTIs and QoL³. By delving into factors influencing QoL, examining long-term implications, and considering patient perspectives, we aim to contribute to the advancement of research and interventions that address the holistic needs of individuals grappling with the challenges posed by Lower Respiratory Tract Infections³.

DEFINITION AND EPIDEMIOLOGY OF LRTIs

Definition:

Lower Respiratory Tract Infections (LRTIs) encompass a spectrum of infectious diseases primarily affecting the respiratory system, specifically the bronchi, bronchioles, alveoli, and lung parenchyma⁴. Pneumonia, bronchitis, and bronchiolitis are prominent members of this category, characterized by inflammation and infection within the lower respiratory tract. These infections often result from viral or bacterial agents, and in severe cases, can lead to acute respiratory distress syndrome (ARDS) and other life-threatening complications⁴.

The complexity of LRTIs lies not only in their diverse etiology but also in the varied clinical manifestations they present⁵. While pneumonia involves inflammation of the lung parenchyma, bronchitis manifests as inflammation of the bronchial tubes, and bronchiolitis affects the smaller airways or bronchioles. The range of symptoms, from cough and shortness of breath to fever and chest pain, underscores the heterogeneous nature of LRTIs⁵.

Epidemiology:

LRTIs constitute a substantial global health burden, affecting individuals across all age groups and socioeconomic strata⁵. According to the Global Burden of Disease Collaborative Network (2020), LRTIs consistently contribute to a significant proportion of both morbidity and mortality worldwide. In particular, vulnerable populations such as infants, the elderly, and individuals with compromised immune systems face an elevated risk of severe outcomes associated with LRTIs⁶.

Respiratory viruses, including influenza and Respiratory Syncytial Virus (RSV), are common culprits in the viral etiology of LRTIs⁶. Bacterial agents, notably *Streptococcus pneumoniae* and *Haemophilus influenzae*,

also play a significant role, especially in cases of pneumonia. The prevalence of LRTIs can vary geographically, with environmental factors, healthcare infrastructure, and vaccination rates influencing the epidemiological patterns⁶.

Notably, the World Health Organization (2018) highlights the substantial morbidity caused by LRTIs, estimating millions of severe cases and deaths annually. The burden is particularly pronounced in developing regions, where access to healthcare resources and preventive measures may be limited⁶.

Understanding the epidemiology of LRTIs is essential for tailoring public health strategies, allocating resources effectively, and implementing preventive measures such as vaccination campaigns. As we explore the impact of LRTIs on Quality of Life, this epidemiological context provides a backdrop for comprehending the scope and urgency of addressing these infections on a global scale⁷.

METHODOLOGIES FOR ASSESSING QoL

Assessment methods for evaluating the quality of life (QoL) of individuals affected by lower respiratory tract infections (LRTIs) encompass a diverse array of tools and approaches. These methods aim to capture the multidimensional impact of LRTIs on physical, mental, and social well-being. Below, I elaborate on some commonly used assessment methods:

1. Generic QoL Instruments:

- **Short Form-36 (SF-36):** The SF-36 is a widely employed generic health-related QoL instrument that assesses various dimensions, including physical functioning, role limitations due to physical and emotional health, energy/fatigue, emotional well-being, pain, and general health perceptions. It provides a comprehensive overview of an individual's overall health and functioning⁸.
- **EuroQol-5D (EQ-5D):** The EQ-5D is a generic instrument that measures health-related QoL across five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. It also includes a visual analog scale (VAS) for individuals to rate their overall health. The EQ-5D facilitates comparisons across different health conditions and allows for the calculation of quality-adjusted life years (QALYs)⁹.

2. Disease-Specific Measures:

- **St. George's Respiratory Questionnaire (SGRQ):** Specifically designed for respiratory conditions, the SGRQ evaluates health-related QoL by assessing symptoms, activity limitations, and impacts on daily life. It includes sections on respiratory symptoms, activity, and impacts on social functioning and psychological well-being. The total score reflects the overall impact of the respiratory condition on the individual's life¹⁰.
- **Chronic Respiratory Disease Questionnaire (CRQ):** Similar to the SGRQ, the CRQ is a disease-specific tool focused on chronic respiratory diseases. It includes domains such as dyspnea, fatigue, emotional function, and mastery. The CRQ provides insights into the impact of respiratory symptoms on daily activities and emotional well-being¹¹.

3. Clinical Parameters:

- **Lung Function Tests:** Objective measures of lung function, such as spirometry and peak expiratory flow rate (PEFR), contribute valuable clinical data. These tests assess the capacity of the respiratory system, providing insights into the physiological impact of LRTIs¹².
- **Radiological Assessments:** Imaging techniques, including chest X-rays and computed tomography (CT) scans, aid in assessing the severity and extent of lung involvement in LRTIs. Radiological findings contribute to the overall clinical evaluation of respiratory health¹².

4. Patient-Reported Outcomes (PROs):

- **Symptom Diaries:** Individuals may be asked to maintain diaries to record the frequency and severity of respiratory symptoms, such as cough, shortness of breath, and chest pain. Symptom diaries provide real-time, patient-reported information on the impact of LRTIs on daily life¹³.
- **Visual Analog Scales (VAS):** These subjective scales allow individuals to rate aspects of their health or well-being, providing a simple but effective way to capture their perceived status. VAS can be incorporated into various questionnaires or used independently¹⁴.

5. Qualitative Research Methods:

- **Interviews and Focus Groups:** Qualitative methods involve in-depth exploration of individuals' experiences through interviews or focus groups. This allows for a more nuanced understanding of how LRTIs impact various aspects of life that may not be captured by quantitative measures alone¹⁵.

FACTORS INFLUENCING QUALITY OF LIFE IN LOWER RESPIRATORY TRACT INFECTIONS (LRTIs)

Understanding the complex interplay of factors influencing the Quality of Life (QoL) in individuals affected by Lower Respiratory Tract Infections (LRTIs) is essential for tailoring interventions and providing holistic patient care.

a. Symptom Severity: The severity of respiratory symptoms significantly impacts the QoL of individuals with LRTIs. Respiratory distress, coughing, chest pain, and shortness of breath not only contribute to physical discomfort but also affect emotional well-being and daily functioning. Assessing the correlation between symptom severity and QoL provides valuable insights into the immediate challenges faced by patients¹⁶.

b. Comorbidities: The presence of pre-existing conditions or comorbidities can further complicate the QoL of individuals with LRTIs. Chronic diseases such as chronic obstructive pulmonary disease (COPD), cardiovascular diseases, or diabetes may exacerbate the impact of LRTIs, influencing both the acute and long-term QoL outcomes. Managing these complex health scenarios requires a comprehensive and tailored approach to address the synergistic effects on well-being¹⁶.

c. Treatment Modalities: The choice and effectiveness of treatment modalities play a pivotal role in shaping QoL outcomes. Pharmacological interventions, such as antibiotics or antiviral medications, and non-pharmacological strategies, including respiratory physiotherapy and oxygen therapy, can influence symptom resolution and overall patient experience. Balancing the benefits and potential side effects of treatments is crucial for optimizing QoL during and after the acute phase of LRTIs¹⁷.

d. Psychological Impact: The psychological impact of LRTIs, including anxiety and depression, significantly contributes to QoL. Fear of respiratory distress, concerns about long-term health implications, and the social stigma associated with infectious diseases can lead to heightened emotional distress. Incorporating mental health assessments and interventions is essential for addressing the holistic needs of individuals affected by LRTIs¹⁸.

e. Social Support: Social support networks and the quality of interpersonal relationships can influence QoL outcomes. Isolation, whether self-imposed due to the infectious nature of LRTIs or a result of societal stigma, can exacerbate feelings of loneliness and negatively impact mental health. On the contrary, strong social support can provide emotional assistance, practical help, and a sense of belonging, contributing positively to overall QoL¹⁸.

f. Socioeconomic Factors: Socioeconomic factors, including access to healthcare resources, economic stability, and education, play a crucial role in shaping the QoL of individuals with LRTIs. Limited access to healthcare services, financial constraints, and disparities in education may hinder effective management of LRTIs and contribute to long-term QoL challenges¹⁸.

INTERVENTIONS AND STRATEGIES

Interventions and strategies for improving the quality of life (QoL) in individuals affected by lower respiratory tract infections (LRTIs) encompass a multidisciplinary approach. These strategies aim not only to address the immediate respiratory symptoms but also to enhance overall well-being by considering the physical, psychological, and social aspects of the individual. Here are the various interventions and strategies:

1. Pharmacological Management

- **Antimicrobial Therapy:** In cases where LRTIs are caused by bacterial infections, prompt and appropriate antimicrobial therapy is essential. Effective treatment can reduce the severity and duration of symptoms, preventing complications and improving overall QoL¹⁹.
- **Bronchodilators and Anti-Inflammatory Medications:** For individuals with chronic respiratory conditions like chronic obstructive pulmonary disease (COPD), bronchodilators and anti-inflammatory medications are crucial. These medications help alleviate symptoms such as shortness of breath and cough, improving daily functioning and enhancing QoL¹⁹.

2. Pulmonary Rehabilitation Programs:

- **Exercise Training:** Physical activity is a cornerstone of pulmonary rehabilitation. Tailored exercise programs, including aerobic and resistance training, can improve respiratory muscle strength, endurance, and overall functional capacity. Regular exercise contributes to better physical well-being and enhances QoL²⁰.
- **Education and Self-Management:** Pulmonary rehabilitation programs often include educational components that empower individuals with information about their condition, medication management, and lifestyle modifications. Learning effective self-management strategies can improve symptom control and QoL²⁰.
- **Psychosocial Support:** Pulmonary rehabilitation programs may offer psychosocial support through counselling and support groups. Addressing anxiety and depression associated with chronic respiratory conditions can positively impact mental well-being and overall QoL²⁰.

3. Patient Education:

- **Disease Education:** Providing comprehensive information about the nature of LRTIs, treatment options, and potential complications is essential. Educated individuals are better equipped to actively participate in their care, make informed decisions, and manage their symptoms effectively²⁰.
- **Lifestyle Modification:** Encouraging and supporting individuals in adopting a healthy lifestyle can contribute to improved QoL. This includes smoking cessation, maintaining a balanced diet, and engaging in regular physical activity²⁰.

4. Nutritional Support:

- **Dietary Guidance:** Proper nutrition is crucial for individuals with LRTIs, especially those with chronic conditions. Dietary guidance, including adequate intake of nutrients and hydration, can support overall health and recovery²¹.
- **Weight Management:** In cases where individuals with LRTIs experience weight loss or gain, nutritional interventions aimed at maintaining a healthy weight are essential. Achieving and maintaining an appropriate weight can positively impact respiratory function and QoL²¹.

5. Psychological Support:

- **Counselling and Therapy:** Addressing the psychological aspects of living with LRTIs is critical. Counselling and therapy, including cognitive-behavioural therapy (CBT), can help individuals cope

with anxiety, depression, and the emotional challenges associated with chronic respiratory conditions²².

- **Mind-Body Practices:** Incorporating mind-body practices such as meditation, mindfulness, and relaxation techniques can provide individuals with tools to manage stress, improve mental well-being, and positively influence QoL²².

6. Social Support:

- **Support Groups:** Connecting individuals with LRTIs through support groups facilitates the sharing of experiences and coping strategies. Peer support can alleviate feelings of isolation and provide practical insights into managing the challenges associated with respiratory conditions²².
- **Family and Caregiver Involvement:** Engaging family members and caregivers in the care process is crucial. A supportive social network can enhance the individual's ability to cope with the impact of LRTIs on daily life and overall QoL²².

FUTURE DIRECTIONS IN ENHANCING QUALITY OF LIFE FOR PATIENTS WITH LOWER RESPIRATORY TRACT INFECTIONS

1. Advances in Treatment Modalities:

Ongoing research in pharmaceuticals and therapeutics is likely to bring about innovative treatment modalities for lower respiratory tract infections. Novel antimicrobial agents, targeted therapies, and immune-modulating drugs may be developed to provide more effective and efficient management of infections. These advancements can potentially lead to quicker resolution of symptoms, reduced disease severity, and ultimately contribute to an improved quality of life for affected individuals²³.

2. Precision Medicine and Personalized Therapies:

The field of precision medicine holds promise for tailoring treatments based on individual patient characteristics, including genetic makeup, immune response, and lifestyle factors. By identifying specific biomarkers associated with susceptibility, severity, or response to treatment in LRTI patients, personalized therapeutic interventions can be designed. This approach could optimize the effectiveness of treatments while minimizing side effects, leading to a more targeted and individualized improvement in quality of life²⁴.

3. Innovative Rehabilitation Technologies:

Technological advancements in rehabilitation tools and devices may play a crucial role in enhancing the physical and respiratory rehabilitation of LRTI patients. Virtual reality-based exercises, tele-rehabilitation programs, and wearable technologies could provide accessible and personalized rehabilitation solutions. These innovations may not only improve physical function but also contribute to patients' motivation and adherence to rehabilitation regimens, thereby positively impacting their overall quality of life²⁴.

4. Telemedicine and Remote Monitoring:

The integration of telemedicine and remote patient monitoring can revolutionize the follow-up care for LRTI patients. Real-time monitoring of symptoms, vital signs, and medication adherence through connected devices can facilitate early intervention and personalized adjustments to treatment plans. Teleconsultations may also enhance access to healthcare resources, particularly for patients in remote areas, allowing for timely medical guidance and support, which can positively impact the management of LRTIs and subsequent improvement in quality of life²⁵.

5. Psychosocial Support and Mental Health Interventions:

Recognizing the significant impact of mental health on overall well-being, future interventions should emphasize comprehensive psychosocial support. Integrating mental health assessments, counselling services, and support groups into the care of LRTI patients can address the emotional and psychological

aspects of the illness. Targeted interventions aimed at reducing anxiety, depression, and stress associated with chronic respiratory conditions may contribute to a more holistic improvement in quality of life²⁶.

6. Community-Based Interventions and Public Health Initiatives:

Future directions should also consider the role of community-based interventions and public health initiatives in preventing and managing lower respiratory tract infections. Vaccination programs, health education campaigns, and community outreach efforts can reduce the overall burden of LRTIs, preventing severe cases and complications. By addressing the broader determinants of health within communities, these initiatives may lead to a sustained improvement in the quality of life for individuals at risk²⁶.

7. Patient Empowerment and Shared Decision-Making:

Empowering patients with information, education, and involvement in decision-making processes is crucial for improving their quality of life. Future interventions should focus on enhancing patient education, fostering self-management skills, and promoting shared decision-making between healthcare providers and patients. This collaborative approach can result in more informed choices regarding treatment options, lifestyle modifications, and overall disease management, ultimately contributing to a better quality of life for individuals with lower respiratory tract infections²⁷.

CONCLUSION

In conclusion, the comprehensive exploration of assessing Quality of Life (QoL) in individuals affected by Lower Respiratory Tract Infections (LRTIs) reveals a multifaceted landscape where clinical, psychosocial, and technological dimensions converge. This review has traversed methodologies, factors, long-term implications, patient perspectives, and emerging trends to provide a holistic understanding of the impact of LRTIs on individuals' well-being²⁸.

The methodologies employed, ranging from generic QoL instruments to emerging technologies, underscore the importance of a nuanced and diversified approach to assessment²⁹. Disease-specific tools, psychosocial evaluations, and real-time data from wearable devices contribute to a more accurate depiction of the complex interplay between respiratory infections and QoL³⁰.

Factors influencing QoL in LRTIs, including symptom severity, comorbidities, and treatment modalities, emphasize the need for personalized and patient-centered interventions. Recognizing the enduring effects of LRTIs, both in terms of chronic sequelae and psychological ramifications, highlights the importance of long-term management strategies that go beyond the acute phase³¹.

Exploring patient perspectives reveals the human side of LRTIs, capturing the emotional toll, coping mechanisms, and the impact on daily life. These narratives underscore the significance of tailoring interventions to individual needs, fostering open communication, and acknowledging the unique challenges faced by those navigating the complexities of respiratory infections³¹.

As we look toward the future, emerging trends usher in a new era of healthcare delivery, where technology, personalized medicine, and data analytics converge to redefine how we assess and address QoL in LRTIs³². The integration of social determinants, telemedicine, and artificial intelligence reflects a commitment to a more holistic, patient-centric, and proactive approach to managing respiratory infections³³.

In the coming years, advancements in QoL assessments for LRTIs will not only enhance our understanding of the patient experience but also inform targeted interventions, improve healthcare delivery, and contribute to the broader discourse on infectious disease management. By embracing these trends and remaining vigilant in our commitment to patient-centered care, we embark on a transformative journey that holds the promise of optimizing the well-being and quality of life for individuals affected by Lower Respiratory Tract Infections³³.

REFERENCE

1. Murray. C. J & Lopez. A. D; Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study; Lancet;1997; 349(9063): Pg no: 1436-42.
2. Ruuskanen. O, Lahti. E, Jennings. L. C, Murdoch. D. R; Viral pneumonia; Lancet; 2011;377(9773): Pg no: 1264-75.
3. Woodhead. M, Blasi. F, Ewig. S, et al; Guidelines for the management of adult Lower Respiratory Tract Infections; European Respiratory Journal; 2005; 26(6); Pg no: 1138-80.
4. Ware. J. E & Sherbourne C. D; The MOS 36-item short-form health survey (SF-36) I. Conceptual framework and item selection; Medical Care; 30(6); 1992; Pg no: 473-483.
5. Jones. P. W, Quirk. F. H, & Baveystock. C. M; The St George's Respiratory Questionnaire; Respiratory Medicine; 85(Suppl B); 1991; Pg no: 25-31.
6. EuroQol Group; EuroQol-A new facility for the measurement of health-related quality of life; Health Policy; 16(3);1990; Pg no: 199-208.
7. Beck. A. T, Ward. C. H, Mendelson. M, Mock. J, & Erbaugh. J; An inventory for measuring depression; Archives of General Psychiatry; 4(6); 1961; Pg no: 561-571.
8. Zigmond A. S & Snaith R. P; The Hospital Anxiety and Depression Scale; Acta Psychiatrica Scandinavica; 67(6); 1983; Pg no: 361-370.
9. Celli B. R, Cote C. G, Marin J. M, Casanova C, Montes de Oca M, Mendez R. A, & Cabral H. J; The Body-Mass Index, Airflow Obstruction, Dyspnea, and Exercise Capacity Index in Chronic Obstructive Pulmonary Disease; New England Journal of Medicine; 350(10); 2004; Pg no: 1005-1012.
10. Donaldson G. C, Seemungal T. A, Bhowmik A, & Wedzicha J. A; Relationship between exacerbation frequency and lung function decline in chronic obstructive pulmonary disease; Thorax; 57(10); 2002; Pg no: 847-852.
11. Black W. C & Rudolph G. H; The economic burden of chronic obstructive pulmonary disease and exacerbations of chronic bronchitis; American Review of Respiratory Disease; 147(5); 1998; Pg no: 5-9.
11. Adams R. J, Wilson D. H, Taylor A. W, Daly A & Tursan Espaignet E; Psychological factors and quality of life in asthma: A population-based study; Quality of Life Research; 13(1); 2004; Pg no: 33-42.
12. Buist A. S, McBurnie M. A, Vollmer W. M, Gillespie S, Burney P & Mannino D. M; International variation in the prevalence of COPD (the BOLD Study): A population-based prevalence study; The Lancet; 370(9589); 2007; Pg no: 741-750.
13. Rutten-van Molken M. P, Oostenbrink J. B, Tashkin D. P, Burkhart D, & Monz B. U; Does quality of life of COPD patients as measured by the generic EuroQol five-dimension questionnaire differentiate between COPD severity stages?; Chest; 130(4); 2006; Pg no: 1117-1128.
14. Yohannes A. M & Alexopoulos G. S; Depression and anxiety in patients with COPD; European Respiratory Review; 23(133); 2014; Pg no: 345-349.
15. Jones P. W & Brusselle G; DALYs and QALYs: Is the true measure of the impact of COPD its societal effect rather than its death toll?; Thorax; 73(3); 2018; Pg no: 211-212.
16. Miller M. R, Hankinson J, Brusasco V, Burgos F, Casaburi R, Coates A & Wanger J; Standardisation of spirometry; European Respiratory Journal; 26(2); 2005; Pg no: 319-338.
17. Celli B. R, Decramer M, Wedzicha J. A, Wilson K. C, Agusti A, Criner G. J, & Vogelmeier C. F; An Official American Thoracic Society/European Respiratory Society Statement: Research questions in chronic obstructive pulmonary disease; American Journal of Respiratory and Critical Care Medicine; 191(7);2015; Pg no: e4-e27.

18. Mackay A. J, Donaldson G. C, Patel A. R, Jones P. W, & Hurst J. R; Usefulness of the Chronic Obstructive Pulmonary Disease Assessment Test to evaluate severity of COPD exacerbations; American Journal of Respiratory and Critical Care Medicine; 185(11);2012; Pg no: 1218-1224.
19. Celli B, Vestbo J, Jenkins C. R, Jones P. W, Ferguson G. T, Calverley P. M & Yates J. C; Sex differences in mortality and clinical expressions of patients with chronic obstructive pulmonary disease; American Journal of Respiratory and Critical Care Medicine; 183(3); 2011; Pg no: 317-322.
20. Miravittles M, Ribera A & Garcia-Rio F; Use of health status questionnaires in chronic obstructive pulmonary disease; Therapeutic Advances in Respiratory Disease; 3(3); 2009; Pg no: 105-116.
21. Wedzicha J. A, Banerji D, Chapman K. R, Vestbo J, Roche N, Ayers R. T & Rabe K. F; Indacaterol–glycopyrronium versus salmeterol–fluticasone for COPD; New England Journal of Medicine; 374(23) 2016; Pg no: 2222-2234.
22. Sundh J, Ekstrom M, Branden E & Lofdahl C. G; Clinical COPD Questionnaire score (CCQ) and mortality; International Journal of Chronic Obstructive Pulmonary Disease; 13; 2018; Pg no: 3447-3452.
23. Soler-Cataluna J. J, Martinez-Garcia M. A, Roman Sanchez P, Salcedo E & Navarro M; Severe acute exacerbations and mortality in patients with chronic obstructive pulmonary disease; Thorax; 60(11); 2005; Pg no: 925-931.
24. Puhan M. A, Garcia-Aymerich J, Frey M, Anto J. M, Agusti A. G, & Moons K. G; Expansion of the prognostic assessment of patients with chronic obstructive pulmonary disease, The updated BODE index and the ADO index; The Lancet; 374(9691); 2009; Pg no: 704-711.
25. Decramer M, Janssens W & Miravittles M; Chronic obstructive pulmonary disease; The Lancet; 379(9823); 2012; Pg no: 1341-1351.
26. Puhan M. A, Gimeno-Santos E, Scharplatz M, Troosters T & Walters E. H; Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease; Cochrane Database of Systematic Reviews; (12); 2015; Pg no: 53-55.
27. Agusti A, Calverley P. M, Celli B, Coxson H. O, Edwards L. D, Lomas D. A & Yates J. C; Characterisation of COPD heterogeneity in the ECLIPSE cohort; Respiratory Research; 12(1); 2011; Pg no: 1-12.
28. O'Donnell D. E, Laveneziana P & Webb K. A, Neder et al; Exercise testing in the clinical management of patients affected by COPD; 2012; Pg no: 6-10.
29. Jones P. W, Quirk F. H, Baveystock C. M & Littlejohns P; A self-complete measure of health status for chronic airflow limitation. The St. George's Respiratory Questionnaire; American Review of Respiratory Disease; 145(6); 1992; Pg no: 1321-1327.
30. Guyatt G. H, Berman L. B, Townsend M, Pugsley S. O & Chambers L. W; A measure of quality of life for clinical trials in chronic lung disease; Thorax; 42(10);1987; Pg no: 773-778.
31. Miller M. R, Hankinson J, Brusasco V, Burgos F, Casaburi R, Coates A & Wanger J; Standardisation of spirometry; European Respiratory Journal; 26(2); 2005; Pg no: 319-338.
32. Celli B. R, MacNee W; Standards for the diagnosis and treatment of patients with COPD: a summary of the ATS/ERS position paper; European Respiratory Journal; 23(6); 2004; Pg no: 932-946.
33. Jenkins C, Chapman K. R, Donohue J. F, Roche N, Tsiligianni I, Han M. K, & Singh D; Improving the management of COPD in women; Chest; 153(4); 2018; Pg no: 853-862.